

CASTING DEFECTS

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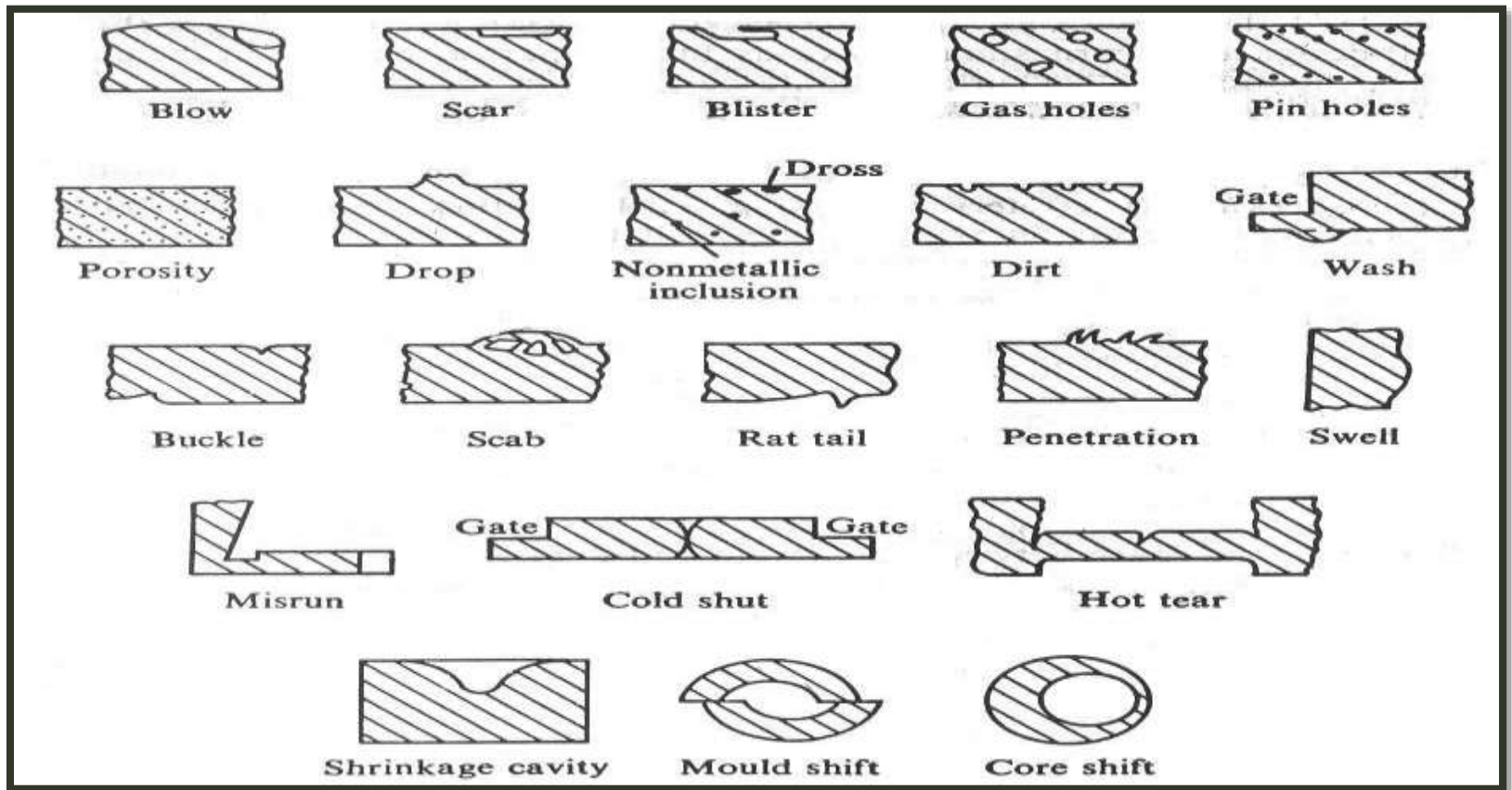
- A casting defect is an irregularity in the metal casting process that is undesired.
- It can also be defined as conditions in a casting that must be corrected or removed, or the casting must be rejected.
- It may sometimes be tolerated, sometimes eliminated with proper moulding practice or repaired using methods such as welding, metallization etc.
- There are many types of defects which result from many different causes. Some of the remedies to certain defects may be the cause for another type of defect.

CASTING DEFECTS

- Defects in castings occur due to various causes. Although it is quite difficult to establish a relationship between defects & causes, casting defects are roughly broken down into five main categories :
 - ❖ Gas Defects
 - ❖ Moulding Material Defects
 - ❖ Pouring Metal Defects
 - ❖ Metallurgical Defects

All of these categories include various types of defects which are shown below:

CASTING DEFECTS





MISMATCH



➤ The casting that does not match at the parting line is known as Mismatch or Mould shift.

➤ Causes :

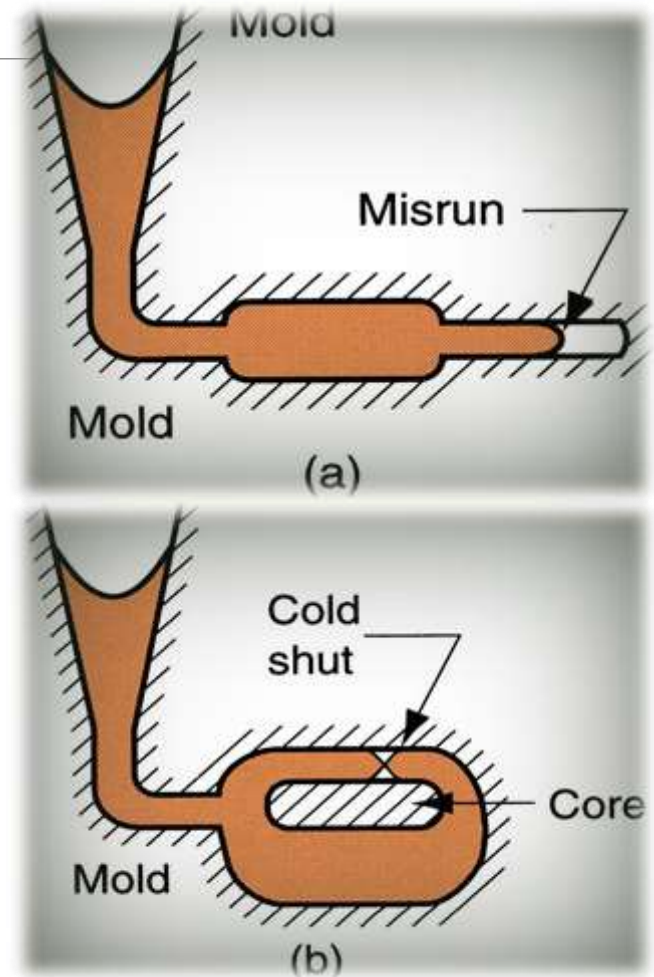
- Worn out or bent clamping pins.
- Misalignment of two halves of pattern.
- Improper location & support of core.
- Faulty core boxes.
- Loose dowels.

➤ Remedies :

- Increase strength of mould & core.
- Provide adequate support to core.
- Proper alignment of two halves of the pattern.
- Proper clamping of mould box.
- Repair or replace dowels & pin causing mismatch.

MISRUN & COLD SHUTS

- When the metal is unable to fill the mould cavity completely & thus leaves unfilled cavities, it is called as misrun defect.
- When two metal streams meeting in the mould cavity, do not fuse together properly, causing discontinuity or weak spot inside casting, it is called as cold shuts.



MISRUN & COLD SHUTS

➤ Causes :

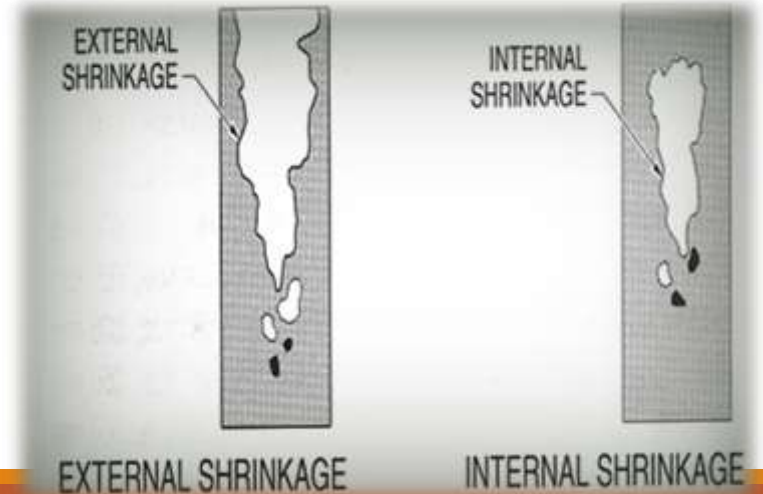
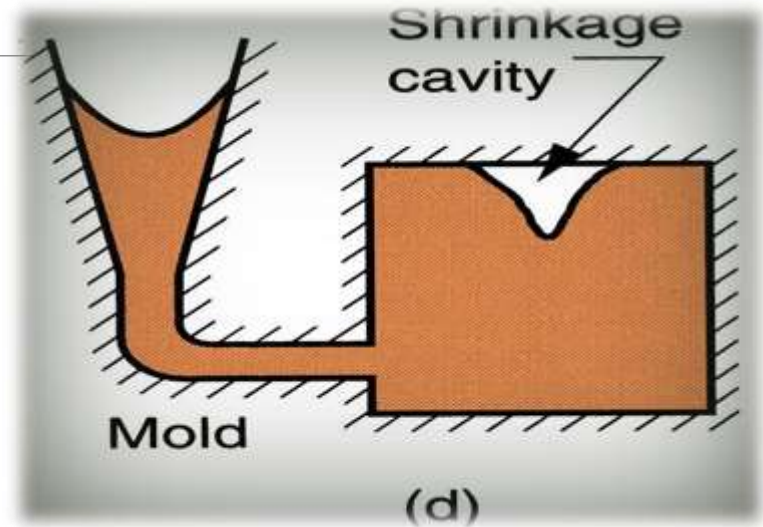
- Low pouring temperature.
- Faulty gating system design.
- Too thin casting sections.
- Slow and intermitted pouring.
- Improper alloy composition.
- Use of damaged pattern.
- Lack of fluidity in molten metal.

➤ Remedies :

- Smooth pouring with the help of monorail.
- Properly transport mould during pouring.
- Providing appropriate pouring temperature.
- Modifying the gating system design.

SHRINKAGE CAVITY

- Shrinkage cavity is a void on the surface of the casting caused mainly due to uncontrolled and haphazard solidification of the metal.
- Shrinkage defects can be split into two different types:
 - 1) External shrinkage
 - 2) Closed shrinkage defects.



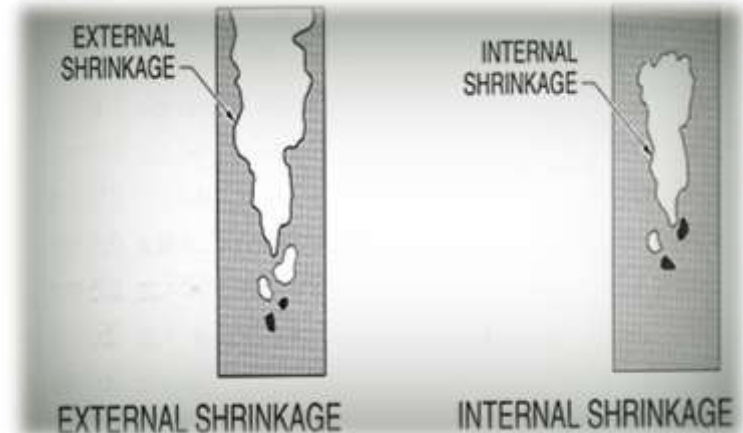
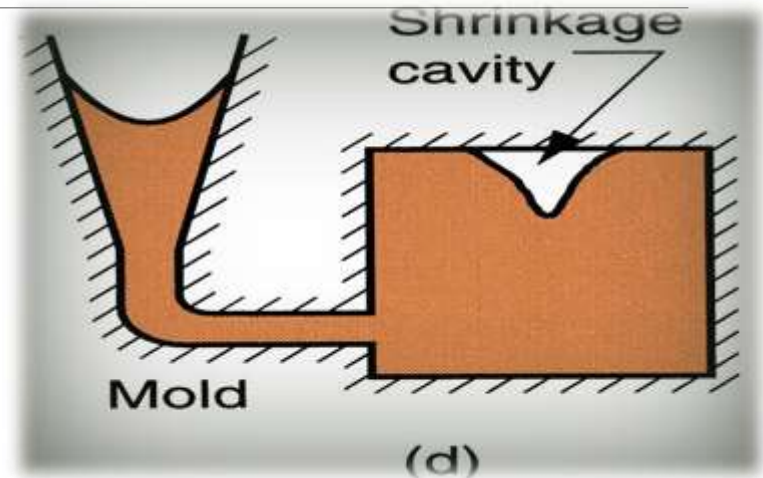
SHRINKAGE CAVITY

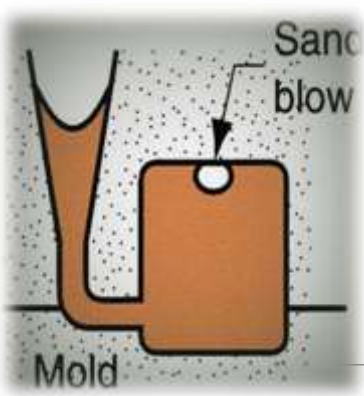
➤ Causes:

- Inadequate and improper gating & risering system.
- Too much high pouring temperature.
- Improper chilling.

➤ Remedies:

- Ensure proper directional solidification by modifying gating, risering & chilling system.





BLOW HOLES



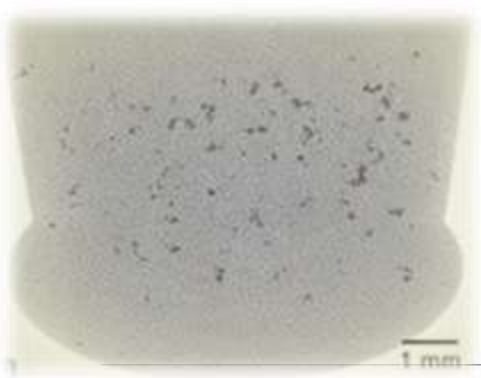
- Balloon shaped gas cavities caused by release of mould gases during pouring are known as blow holes.

➤ Causes :

- Ramming is too hard.
- Cores are not sufficiently baked.
- Excess moisture content.
- Low sand permeability.
- Excessive fineness of sand grains.
- Rusted chills, chaplets & inserts.
- Presence of gas producing ingredients.

➤ Remedies :

- Baking of cores properly.
- Control of moisture content in moulding sand.
- Use of rust free chills, chaplets & inserts.
- Provide adequate venting in mould and cores.
- Ramming the mould less harder.



POROSITY



- Porosity is in the form of cavities caused due to gas entrapment during solidification.

- Causes :

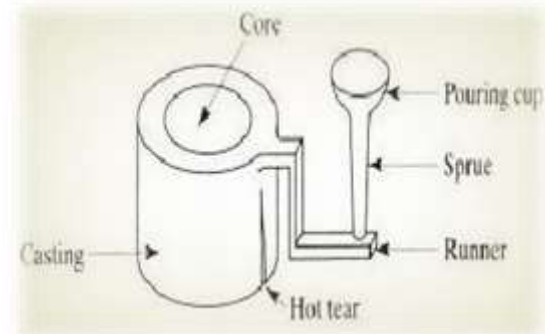
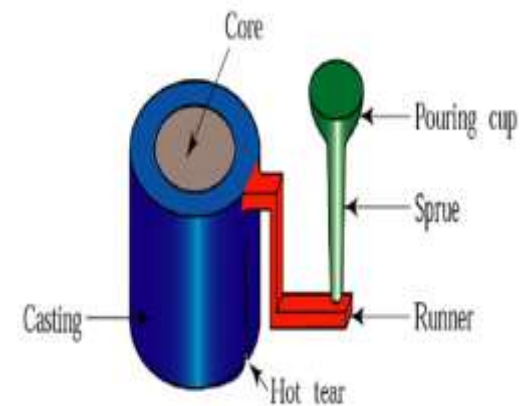
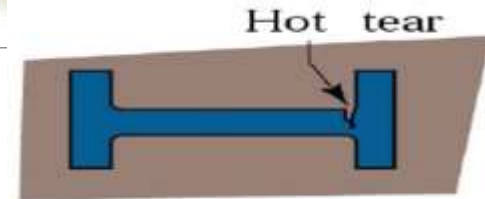
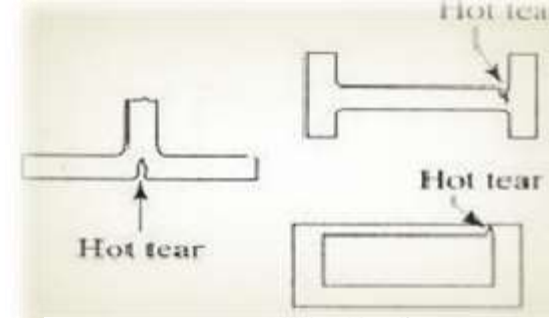
- High pouring temperature.
- Gas dissolved in metal charge.
- Less flux used.
- Molten metal not properly degassed.
- Slow solidification of casting.
- High moisture and low permeability of mould.

- Remedies :

- Regulate pouring temperature
- Control metal composition.
- Increase flux proportions.
- Ensure effective degassing.
- Modify gating and risering.
- Reduce moisture and increase permeability of mould.

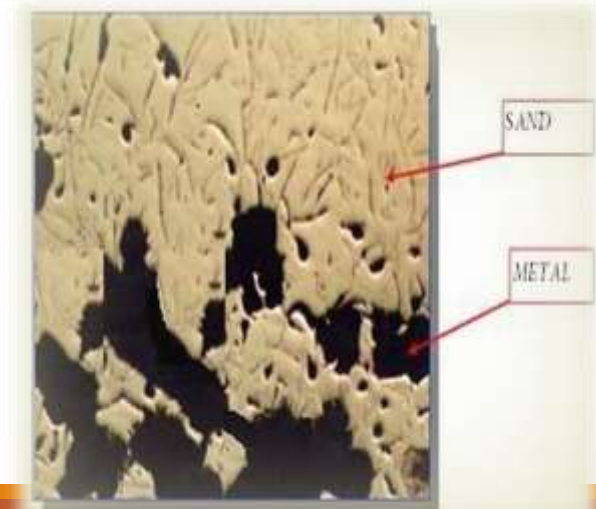
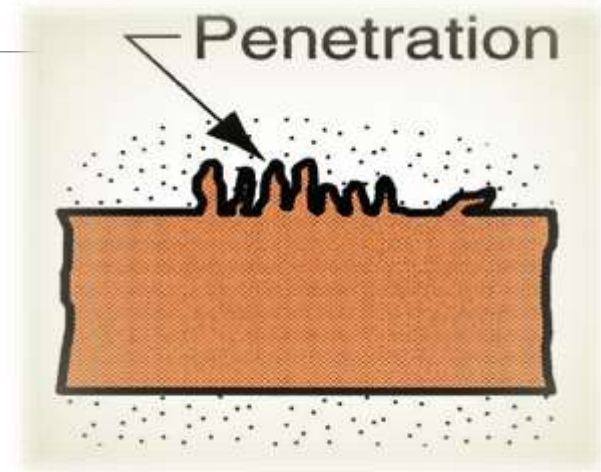
HOT TEARS or HOT CRACKING

- Hot tears are ragged irregular internal or external cracks occurring immediately after the metal have solidified.
- Causes :
 - Lack of collapsibility of core & mould.
 - Hard ramming of mould.
 - Faulty casting design.
- Remedies :
 - Providing softer ramming.
 - Improve casting design.
 - Improve collapsibility of core & mould.



METAL PENETRATION

- Penetration occurs when the molten metal flows between the sand particles in the mould.
- Causes :
 - Low strength of moulding sand.
 - Large size of moulding sand.
 - High permeability of sand.
 - Soft ramming.
- Remedies :
 - Use of fine grain with low permeability.
 - Appropriate ramming.



PIN HOLES

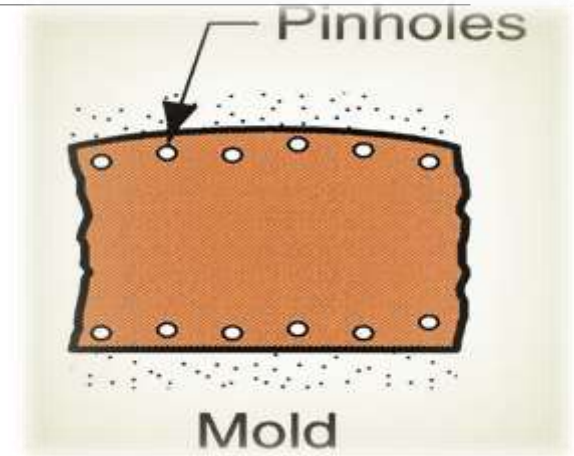
➤ Formation of many small gas cavities at or slightly below surface of casting is called as pin holes.

➤ Causes :

- Sand with high moisture content.
- Absorption of hydrogen/carbon monoxide gas in the metal.
- Alloy not being properly degassed.
- Sand containing gas producing ingredients.

➤ Remedies :

- Reducing the moisture content & increasing permeability of moulding sand.
- Employing good melting and fluxing practices.
- Improving a rapid rate of solidification.



SWELL

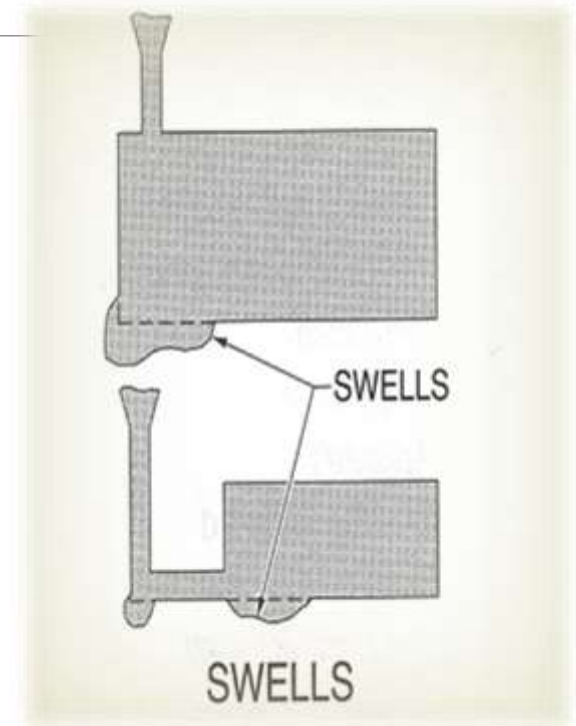
➤ A swell is an enlargement of mould cavity by localized metal pressure.

➤ Causes :

- Insufficient or soft ramming.
- Low strength mould & core.
- Mould not being supported properly.

➤ Remedies :

- Sand should be rammed evenly and properly.
- Increase strength of mould & core.



DROP

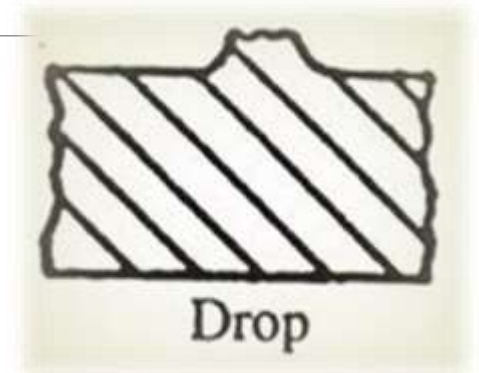
➤ Drop is a projection on drag part of casting due fall of its cope part.

➤ Causes :

- Low green strength of the moulding sand.
- Low mould hardness.
- Insufficient reinforcement of sand projections in the cope.

➤ Remedies :

- Moulding sand should have sufficient green strength.
- Provide adequate reinforcement to sand projections and cope by using nails and gagers.
- Ramming should not be too soft.



RAT TAILS or BUCKLES

- Slight compression failure of a thin layer of moulding sand is called as rat tails & more severe compression failure is called as buckles i.e. Buckling of sand.

- Causes :

- Excessive mould hardness.
- Lack of combustible additives in the moulding sand.
- Continuous large surfaces on the casting.

- Remedies :

- Suitable addition of combustible additives to moulding sand.
- Reduction in mould hardness.
- Modifications in casting design.

